

Marine Biological Laboratory
1102 E. O.W.
JAN 7 1985
Woods Hole, Mass.

PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES

Vol. 43, No. 20, pp. 317-321, 3 figs.

December 11, 1984

**AMAZONSPRATTUS SCINTILLA, NEW GENUS AND SPECIES
FROM THE RIO NEGRO, BRAZIL, THE SMALLEST
KNOWN CLUPEOMORPH FISH**

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ABSTRACT: *Amazonsprattus scintilla* new genus and species, inhabiting the Rio Negro and its tributaries in the Amazon basin of Brazil and feeding on minute aquatic Diptera and planktonic Cladocera, is the smallest known clupeomorph fish. The largest specimen is 19.5 mm standard length, but males and females are sexually ripe as small as 14-16 mm. Superficially it looks very much like a herring and particularly resembles the tropical western Atlantic genus *Jenkinsia* (Clupeidae). On the other hand, further investigation might indicate that it is closely related to some small and poorly known Amazonian anchovies currently placed in *Anchoviella* (Engraulididae).

INTRODUCTION

Among the secondary freshwater fishes sharing the Amazon basin with 1500 or so species of primary freshwater Ostariophysi are somewhat more than a dozen species of the clupeomorph families Clupeidae and Engraulididae. Amazonian Clupeidae, or herrings, include several species of *Ilisha* or *Pellona*, some piscivorous and attaining nearly one meter; *Pristigaster cayana* Cuvier, 1829, with its greatly expanded thorax, attaining perhaps 250 mm; and *Rhinosardinia amazonica* (Steindachner, 1880), typically 40-60 mm long. The Engraulididae, or anchovies, include *Cetengraulis juruensis* Boulenger, 1898, attaining perhaps 200 mm, and a number of species currently placed in *Anchoviella*, some as small as 30-40 mm. Recently, while searching for comparative material of larvae, I was thus surprised to find some sexually ripe Amazonian fishes, which looked like clupeomorphs, less than

20 mm in standard length. Study of cleared and stained preparations confirmed that these specimens are not Ostariophysi and that they represent an undescribed genus and species of clupeomorph.

Amazonsprattus, new genus

TYPE-SPECIES.—*Amazonsprattus scintilla*, new species.

DIAGNOSIS.—Minute, slender, scaleless clupeomorphs without pre- or post-pelvic abdominal scutes. Ventral myotomic progression incomplete. Premaxilla absent or minute and toothless. Maxilla with 16-20 very small conical teeth. Two supramaxillae. Dentary and palate usually toothless (one tooth observed on dentary in one specimen). Branchiostegal rays 4-5. Dorsal fin with 12-13 rays, its origin in posterior half of body; anal fin with 14-16 rays, its origin below anterior third of dorsal fin. Pectoral fin rays 7-9. Pelvic fin rays 6.



FIGURE 1. *Amazonsprattus scintilla*, 17.0 mm (holotype, CAS 52175).

Amazonsprattus scintilla, new species

(Figures 1-3)

HOLOTYPE.—CAS 52175, 17.0 mm (sex undetermined), Rio Jufari between Castanheiro Grande and Santa Fé, collected by Martin Brittan, 21 April 1964.

PARATYPES.—CAS 52176, 18: 14.3-19.0 mm (five males, eight females, six sex undetermined), collected with holotype (5: 16.5-19.0 mm cleared and stained with alcian and alizarin); CAS-SU 68891, 19.5 mm (sex undetermined), Rio Negro at Santa Isabel, collected by Carl Ternetz, 17 January 1925.

DESCRIPTION.—Head compressed and moderately elongate, its length almost four times in standard length. Eyes moderately large and strongly compressed or flattened laterally. Eye diameter about four times in head length. Entire medial surface of eyes closely approximate (so that forebrain is confined to a small space dorsal to eyes), and medial surface of eyes just as flat as lateral surface. Ventral surface of eyeball with a prominent choroid fissure. Hyaline eyelid well developed. Snout moderately elongate, its length about equal to eye diameter. Nasal organ moderately large, with rather small anterior and posterior nostrils. Mouth terminal. Lower jaw elon-

gate, extending posteriorly to below posterior margin of eye, but gape much restricted and entirely anterior to eye. Maxilla slender and moderately elongate, extending posteriorly to below anterior margin of eye. Anterior and posterior portions of cranial fontanel open, posterior portion entirely bridged by a narrow, cartilaginous taenia medialis. Circumorbital bones apparently five (very fragile, hence easily broken, and staining very weakly with alcian). Hyosymplectic entirely cartilaginous, without large, axe-shaped anterodorsal process usually present in clupeids. Opercle with strongly concave dorsoanterior and dorsoposterior margins; dilatator process of opercle present but weakly developed. First gill arch with a total of 18-19 large, elongate gill rakers on its leading edge. Rakers on trailing edge of first gill arch and on successive arches slightly less numerous and considerably smaller. Upper and lower pharyngeal toothplates small, with 8-10 conical teeth (branchial and hyoid arches otherwise edentulous). Hyoid and branchial arches entirely cartilaginous except for branchiostegal rays, gill rakers, and pharyngeal toothplates.

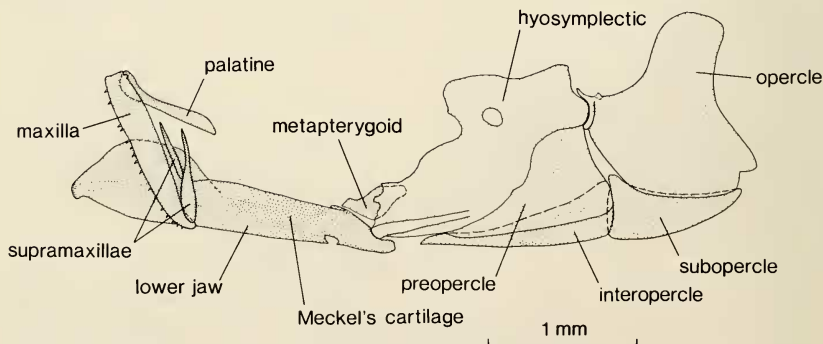


FIGURE 2. *Amazonsprattus scintilla*, 18.0 mm, CAS 52176. Lateral view of jaws, suspensorium, and opercular bones (hyosymplectic and palatine cartilaginous).

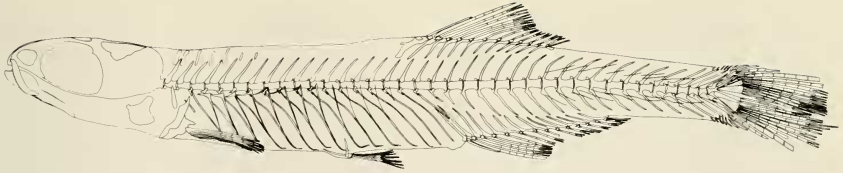


FIGURE 3. *Amanssprattus scintilla*, 18.8 mm, CAS 52176. Axial skeleton. Total vertebrae $17 + 21 = 38$; pectoral girdle abnormally incomplete; a series of 10–11 small, irregularly triradiate intermuscular bones lateral to vertebrae 2–13 has been omitted for clarity.

Body compressed, slender, its greatest depth about 6–8 in standard length. Abdomen rounded. Myotomes well defined, those fully formed 33–34, or about four fewer than total vertebrae. Dorsal and anal fin rays low set, with moderately falcate margins, dorsal fin rays about 1.5 times longer than anal. Pectoral and pelvic fins relatively small, pelvic smaller than pectoral. Pelvic scute variably developed, absent or failing to stain in some specimens, weakly to strongly stained with alcian or alizarin in others. In specimens with relatively well developed scutes there is an elongate anteromedian process and an elongate lateral ascending process on each side. Pectoral girdle with bony posttemporal, supracleithrum, and cleithrum (postcleithra absent), cartilaginous scapulocoracoid, and three rows of radials (proximal, medial, and distal, with five, five, and eight radials respectively). Caudal fin moderately deeply forked, upper and lower lobes about equal and with rounded margins. Upper and lower lobes overlapping slightly when adducted. Principal rays 4–5 of upper lobe and 3–4 of lower lobe with delicate alar flaps (not illustrated). In an 18.8-mm specimen the large alar flap on ray 5 consisted of four overlapping scalelike laminae (lightly stained with alcian) that may actually be modified scales. Caudal fin with $10 + 9$ principal rays, 8–9 upper and 8 lower procurrent rays. Caudal fin skeleton with a parhypural, six separate hypurals, and a single epural. Hypural 2 fused to complex ural centrum (as in many clupeoids).

Total vertebrae 37(4) or 38(1), 16–17 abdominal plus 20–21 caudal. All vertebrae with a simple, slender neural spine. Supraneurals 6–8. Origin of pelvic fin below vertebrae 13–14, of dorsal fin above vertebra 18, and of anal fin below vertebrae 20–21. All abdominal vertebrae except first two with fully developed ribs. First two ver-

tebrae usually without ribs, sometimes second vertebrae with incompletely developed ribs (Fig. 3). Distal ends of most abdominal ribs deflected posteriorly. First two caudal vertebrae with reduced ribs. Intermuscular bones well developed anteriorly and posteriorly. Anteriorly two dissimilar and morphologically complex sets of intermuscular bones. A series of about 13 epipleural intermuscular bones parallel to abdominal vertebrae 3–16. Anteriormost eight epipleurals with a well developed anteromedial process proximally; this process is absent from last five epipleurals, which become progressively smaller. Distal ends of epipleurals, except reduced posteriormost one, closely approximated to distal half of ribs (Fig. 3). In addition to epipleurals, a series of 10–11 small, irregularly triradiate intermuscular bones lies just dorsal to epipleurals and directly lateral to centra of abdominal vertebrae 2–12 or 13 (not illustrated). Posterior two processes of these triradiate elements lie quite near body surface, but anterior process lies much deeper. Posteriorly, two similar series of 8–10 simple dorsal and ventral intermuscular bones extend laterally just above and below caudal vertebrae 9–19 (Fig. 3).

Alimentary canal with a well-defined stomach. Pyloric caeca in two or three groups: a dorsal group with one or two elongate caeca; a ventral group with about four or five elongate caeca; and sometimes a second ventral group of about four short, poorly defined or only partially separate caeca. Intestine straight. Gut contents of four specimens were as follows: specimen 1) two dipteran pupae; specimen 2) a single dipteran pupa; specimen 3) numerous small Cladocera of two size classes, $270 \times 150 \mu\text{m}$ and $72 \times 55 \mu\text{m}$; and specimen 4) a single dipteran pupa, several small dipteran larvae, and moderately numerous

cladocerans of a single kind. My sketches of the cladocerans in this fourth specimen, $424 \times 255 \mu\text{m}$, with a pair of curved, divergent, strongly deflected horns $184 \mu\text{m}$ long projecting from the rostrum, were tentatively identified as *Bosminopsis deitersi* Richard, 1895, by Thomas Zaret.

Gonads readily identifiable in most of the type-specimens. Eight, 15.9–18.2 mm, have creamy or pale orangish ovaries with eggs in more or less good condition observable through body wall with transmitted light. One of these, 17.3 mm, contained 20 eggs 0.2 mm in diameter. Five, 14.3–16.2 mm, have milk-white testes. In two of these the testes are particularly well developed and exhibit numerous "segments" or laminae, about five per myotome, comparable to laminae observed in testes of other minute teleosts (e.g., *Sundasalanx*; Roberts 1981, fig. 1a). In both sexes the gonads appear to be single and occupy only the posterior half of the body cavity, from about the origin of the pelvic fin to the vent. In seven specimens, 16.0–19.5 mm, gonads not observed and sex undetermined.

Judging from preserved material live *Amazonsprattus* probably are translucent or even transparent. Only a few melanophores on head, largest and most obvious a group of about six superficial to cleithrum and clearly visible through gill cover, and two large ones on either side of dorso-posterior margin of hindbrain (Fig. 1). A number of large, deep-lying melanophores associated with posteroventral portion of cranium (not illustrated). Dorsal surface of cranium otherwise usually devoid of pigment. Tip of snout and lower jaw, and side of head just below eye and midway between eye and end of gill cover sometimes with a few small melanophores. Body with relatively few melanophores, mostly on ventral half, including base of anal fin and caudal peduncle. A row of about 10 melanophores, one per segment, along each ventral myotomic border, and a midventral row of about five near pelvic fins. Two rows of segmental melanophores near anal fin base: one row at ventral end of myotomes and between pterygial muscles, another on bases of anal-fin rays. A row of small melanophores, more than one per segment, on ventral portion of caudal peduncle, and some small melanophores near base of caudal fin. A nearly straight row of small segmental melanophores on side of body just above midline (without evident anatomical relationship to any un-

derlying structures). In holotype and most paratypes this row commences posterior to dorsal fin origin (Fig. 1), but in some paratypes it extends nearly entire length of body. Dorsal surface of body devoid of pigmentation. A few melanophores on basal portion of anterior dorsal fin rays, but dorsal fin without basal melanophores like those of anal fin. Caudal fin relatively densely pigmented, with large melanophores more or less regularly distributed on upper and lower lobes (Fig. 1); an area near middle of caudal fin devoid of melanophores. Sexual differences in pigmentation not observed.

NOTE ON TYPE-LOCALITIES.—The Rio Jufari is a low-gradient, swampy tributary with an enormous mouth-bay at its confluence with the Rio Negro, about 20 km upriver from the relatively narrow mouth of the much more important Rio Branco. Maps I have seen do not show Castanheiro Grande or Santa Fé; according to the collector (pers. commun. M. Brittan, March 1983) several days of slow boat travel up the Jufari were required to reach the collecting sight. Santa Isabel is an old name for the modern town of Tapurucuará. This portion of the Amazon basin lies within equatorial rain forest; here the waters of the Rio Negro and its tributaries (excepting the Rio Branco) are generally darkly tinted, have a pH of 4–5, and are extremely low in mineral conduct.

ETYMOLOGY.—Amazon; and sprattus (Latin, masc.), a herring or herringlike fish; scintilla (Latin, masc.) a spark, hence the smallest trace or particle (employed as a noun in apposition).

DISCUSSION

Few collectors have preserved specimens of the smallest Amazonian fish species, and it may well be that the smallest species of various other groups have yet to be discovered. In the Amazon, where community structure of freshwater fishes may be more complex than anywhere else, minute body size seems to have arisen primarily in response to biotic factors. This, in my opinion, is the general reason why so many of the smallest Amazonian fishes belong to secondary freshwater fish groups which in terms of relative numbers of species represent an insignificant fraction of the fauna. *Amazonsprattus* provides an excellent example of the survival of a group of secondary fishes in the midst of the Amazonian ichthyofauna by evolution of minute body size and an

entirely freshwater life history, possibly involving year-round continuous reproduction of minute young. Other particularly striking examples of the phenomenon include the two minute species of *Poecilia* (or *Pamphorichthys*) and the two or more minute species of *Microphilypnus*. These are the only members of the families Poeciliidae and Eleotrididae inhabiting the interior of the Amazon basin. For further discussion of these and other examples see Roberts (1972).

Relationships of *Amazonsprattus* are unclear, and for the moment it is perhaps best left unassigned to family. Having examined its skeletal anatomy and made comparisons with a number of herrings and anchovies, I was inclined to place the genus in Clupeidae, largely on account of its jaw structure, which is unlike anything I have observed in Engraulididae. But my colleague Gareth Nelson, who is studying Amazonian *Anchoviella* and has examined some small unde-

scribed species I have not seen, is inclined to believe that it may belong to this group of Engraulididae.

ACKNOWLEDGMENTS

For information, comments, or other assistance I wish to thank Martin Brittan, Norma Chirichigno, Dusty Chivers, Lillian Dempster, William N. Eschmeyer, Karsten Hartel, Michael Hearne, Albertina Kameya, Vincent Lee, Sarah Ward, Thomas Zaret, and George Zorzi. The manuscript was reviewed by Gareth M. Nelson and Peter J. Whitehead.

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